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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/880,005	06/14/2001	Hiroaki Inoue	2001_0756A	4689

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EXAMINER

TRAN, MAI HUONG C

ART UNIT PAPER NUMBER

2818

DATE MAILED: 05/21/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/880,005

Applicant(s)

INOUE ET AL.

Examiner

Mai-Huong Tran

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 05 May 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 24-40 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 24-40 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 10.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### **Claim Rejections - 35 U.S.C. § 102**

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 24-39 are rejected under 35 U. S. C. § 102 (b) as being anticipated by U.S. Patent No. 4,632,857 to Mallory, Jr.

Regarding to claim 24, Mallory, Jr. discloses an electroless-plating liquid for selectively forming a plated film on a surface of an exposed interconnect of a semiconductor device having an embedded interconnect structure, the electroless-plating liquid comprising cobalt ions; a complexing agent; and as a reducing agent, an alkylamine borane that is free from alkali metal as set forth in col. 4, lines 5-66.

Regarding to claims 25 and 32, the electroless-plating liquid further comprising at least one of a stabilizer selected from one or more kinds of heavy metal compounds and sulfur compounds, and a surfactant (col. 4, lines 54-61, col. 5, lines 29-34).

Regarding to claims 26, 30, 33, and 37, the electroless-plating liquid wherein electroless-plating liquid has a pH within a range of from 5 to 14 via a pH adjusting agent that is free from alkali metal (col. 4, lines 25-26).

Regarding to claim 27, Mallory, Jr. discloses an electroless-plating liquid for selectively forming a plated film on a surface of an exposed interconnect of a semiconductor device having an embedded interconnect structure, the electroless-plating liquid comprising cobalt ions; a complexing agent; a compound containing a refractory metal; and as a reducing agent, an alkylamine borane that is free from alkali metal as set forth in col. 3, lines 18-22, and col. 4, lines 5-66.

Regarding to claims 28, 35, and 39, the electroless-plating liquid wherein the refractory metal comprises at least one of tungsten and molybdenum (col. 3, lines 18-22).

Regarding to claims 29 and 36, the electroless-plating liquid further comprising at least one of a stabilizer selected from one or more kinds of heavy metal compounds and sulfur compounds, and a surfactant (col. 4, lines 51-61, and col. 5, lines 29-34).

Regarding to claim 31, Mallory, Jr. discloses a semiconductor device having an embedded interconnect structure of copper, copper alloy, silver or silver alloy interconnects, wherein a surface of an exposed interconnect is selectively covered with a

protective film, the protective film being formed by performing an electroless-plating process with use of an electroless-plating liquid, the electroless-plating liquid comprising cobalt ions; a complexing agent; and as a reducing agent, an alkylamine borane that is free from alkali metal as set forth in col. 4, lines 5-66.

Regarding to claim 34, Mallory, Jr. discloses a semiconductor device having an embedded interconnect structure of copper, copper alloy, silver or silver alloy interconnects, wherein a surface of an exposed interconnect is selectively covered with a protective film, the protective film being formed by performing an electroless-plating process with use of an electroless-plating liquid, the electroless-plating liquid comprising cobalt ions; a complexing agent; a compound containing a refractory metal; and as a reducing agent, an alkylamine borane that is free from alkali metal as set forth in col. 1, lines 31-37, cols. 3-4.

Claim 38 is rejected under the same rationale set forth above to claim 27.

### **Claim Rejections - 35 U.S.C. § 103**

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 40 is rejected under 35 U.S.C. 103 (a) as being unpatentable over U.S.

Patent No. 4,632,857 to Mallory, Jr. in view of the remark.

Mallory discloses the claimed invention except for the protective film has a thickness within a range of from 0.1nm to 500 nm.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to form a protective film that has a thickness within a range of from 0.1nm to 500 nm, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

### **Conclusion**

Any inquiry concerning this communication on earlier communications from the examiner should be directed to Mai-Huong Tran, (703) 305-1958. The examiner can normally be reached on Monday-Thursday from 8:00 AM to 6:30 PM. The examiner's supervisor, David Nelms can be reached on (703) 308-4910.

The fax phone number for the organization where this application or proceeding is assigned is (703) 308-7724. Any inquiry of a general nature or relating to the status of

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this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.



Mai-Huong Tran



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PRIMARY EXAMINER